

MEASUREMENT/TECHNICAL REPORT

FCC Part 15 Sections 15.207, 15.209, 15.249

Logos Av Com

FCC ID: OM4SLV-MA-US

November 24th, 2003

This report concerns (check one): Original grant ☒ Class II change ☐

Equipment type: TELEVOTER SLAVE (ex.: computer, printer, modem, etc.)

Deferred grant request per 47 CFR 0.457(d)(1)(ii)? yes ☐ no ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by: Giuseppe MECCHIA



TÜV ITALIA srl
Via Montalenghe 12
10010 Scarmagno (TO)
Italy
Phone : +39-0125-636911
Fax : +39-0125-636999

Table of Contents	Page
1 GENERAL INFORMATION	3
1.1 Product Description	3
1.1.1 Operational description	3
1.1.2 Modupation upon the carrier	3
1.2 Related Submittal(s)/Grant(s)	4
1.3 Tested System Details	5
1.4 Test Methodology.....	6
1.5 Test Facility.....	6
1.6 Test Equipment List.....	6
2 PRODUCT LABELING	7
3 SYSTEM TEST CONFIGURATION.....	8
3.1 Justification.....	8
3.2 EUT Exercise Software	9
3.3 Special Accessories.....	9
3.4 Equipment Modifications.....	9
3.5 Configuration of the Tested System.....	10
Figure 3.1 Configuration of the Tested System.....	10
4 BLOCK DIAGRAM(S) OF THE EUT.....	11
4.1 Block Diagram Description.....	11
Figure 4.1 Block Diagram of the EUT.. ..	12
5 CONDUCTED AND RADIATED MEASUREMENT PHOTOS.....	13
6 CONDUCTED EMISSION DATA	14
7 RADIATED EMISSION DATA	15
7.2 Field Strength Calculation.....	16
8 PHOTOS OF TESTED EUT	17
User Manual.....	18

1 GENERAL INFORMATION

1.1 Product description

EUT is s transceiver designed to be able to send command to one or more keypad and to receive data from them (FCC ID: OM4SLV-MA-US) whether to receive command from the Master Unit (MST-MA-US) and send data to the same.

The Slave is composed of a metal box containing an electronic card with the logics, the RF transmission and reception of data (transceiver), with 1 antenna screwed into his own socket, which is welded on BCB

1.1.1 Operational description

The system (Slaves and Master) recognize up to 16.383 voting keypads, divided in 32 blocks of 512 each.

When requested by the operator, who control the Master Unit through the PC, a command is sent to the installed slave antennas.

One or more slave antennas (FCCID: OM4SLV-MA-US) could be connected to the Master; up to 32.

Then, the installed slave antennas, one after the other, send a command on air, being able to be received by all the keypad present in the area.

After this command the keypad owners are allowed to enter their choice through the keyboard.

Later, when closing the voting is decided, a second command is sent by the operator through the Master to the antennas, so the antennas, one by one, send on air a command, being able to be understood by the voting keypad, which pertain to the first block of voting pads present in the area.

After this command the antennas switch themselves in "receiving mode" in order to receive, one after the other, the data stored into the voting pad pertaining to the first block.

In this way the system can interrogate by air (TX/RX mode) the available voting keypad (FCC ID: OM4TLV-MA-US) one block at a time, being able to recognize, properly, each voting keypad pertaining the block and receives from each Voting keypad the data indicating the key/s that has/have been previously selected.

This data was, previously, stored into the internal memory of the voting keypad.

Immediately after being received, this data (identifying the voting keypad and the given vote) are sent to the Master Unit (MST-MA-US) through a cable connection RS 485.

In the meantime the slave antennas are collecting another block of pad, until all the present block of voting keypad are collected.

The Master Unit is connected to an outside PC ,through a standard serial port RS232, for the processing and displaying of the results.

1.1.2 Modulation upon the carrier

- only one frequency is used: 916.50 MHz
- modulation type: AFK

Test Report No. RD2003/208bis
Date November 24th, 2003

FCC ID: OM4SLV-MA-US

- data rate max: 56 Kbps

1.2 Related Submittal(s)/Grant(s)

FCC ID: OM4TLV-MA-US

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Model & Serial No.	FCC ID	Description	Cable Descriptions
SLV-MA-US (1) s/n EMC03-380	OM4SLV-MA-US	Televoter slave RS 485 I/F	Shielded signal/power cable
MST-MA-US s/n EMC03-379	None Verified unit	Televoter Master RS 232 I/F	Unshielded power cord Shielded signal cables
Hitek power Mod. 1AA12018 S/n /	none	Power supply for Master	Unshielded power cords
Dell Dimension 4100 mod. MMS s/n FN9010J	D.o.C.	Personal Computer	Unshielded power cord Shielded signal cables
Highscreen mod. MS1990E type J91B s/n 8016001183	AMPJ91B	Monitor	Unshielded power cord Shielded signal cable
Dell SK 8000 S/n CN-03JMY- 38844-08N-J491	D.o.C.	Keyboard	Shielded signal cable
Microsoft Intellimouse S/n 4526477-2	D.o.C.	Mouse	Shielded signal cable
DM 119 s/n 3031602	DYKDM119	Printer, parallel I/F	Unshielded power cord Shielded signal cable
Remotely connected to:			
TLV-MA-US s/n EMC03-381	OM4TLV-MA-US	Televoter Voting Keypad	No cable provided

(1) EUT submitted for grant.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the ANSI C63.4-2001 test procedures . Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

TÜV ITALIA test site No. 3 – semi-anechoic chamber

The semi-anechoic chamber test site and conducted measurement facility used to collect the radiated data are located at Via Montalenghe 12, Scarmagno, Italy. This site has been fully described in a report dated May 14, 2003 submitted to your office, and accepted in a letter dated May 16, 2003 (registration Number: 90860)

By a decision of the Joint Committee of the EU-US Mutual Recognition Agreement, TÜV ITALIA has been listed under the Sectoral Annex on Electromagnetic Compatibility as Conformity Assessment Body (CAB)

This decision is effective from 20 September 2002.

1.6 Test equipment list:

Description	Model	serial No.	Cal due date
Test receiver	Rohde & Sch.ESH3	s/n 881364/012	10/04
Spectrum analyzer	HP 8568B+QP adapter	s/n 2601A02134	04/04
LISN	Schwarzb.NNLA 8120	s/n 8120471A	02/04
Biconical antenna	Tensor 4104	s/n 2222	03/04
Log-periodic antenna	Electro-metrix LPA-25	s/n 1117	03/04
Spectrum analyzer	HP 8562A	s/n 3043A05627	10/04
Horn antenna	EMCO 3115	s/n 3572	11/04

2 PRODUCT LABELING

> See exhibit < Label and label location

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The EUT was configured for testing in a typical fashion (as a customer would normally use it).

In order to simulate a real application, a Master device (MST-MA-US) has been connected to the RS232 port of a fully configured Personal Computer; the antenna module (SLV-MA-US)(EUT) has been connected to the Master through its RS 485 port. A second antenna (identical to the previous one) has been connected to the RS 485 output of first antenna.

According to Logos specifications the two antennas were not transmitting simultaneously.

A voting keypad (FCC ID: OM4TLV-MA-US) has been placed in the chamber, at a convenient distance, in order to operate the EUT, but not to interfere with testing.

3.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

The EUT has been tested in continuous transmission of data in both direction from TLV-MA-US to SLV-MA-US, MST-MA-US and return, in order to activate respectively the transmit and the receive sections of EUT.

Note:

- transmission frequency was fixed
- modulation was fixed

(no regulation are permitted by the operator or factory settings)

Software used:

The P.C. software is used to communicate to the Televoter Master the kind of polling, the numbers of keyswitches enable, the numbers of voting keypads enable, and the numbers of the keyboard enable. The Televoter Master through the Slave units transmit the request of poll to the voting keypads and waits to the answer. This operation is made for every number of the voting keypads enable from the software of P.C.

After receiving of all polls the Televoter Master transfers the polling to the P.C and goes to sleep mode. Its wake up is controlled from P.C when it needs to do a new polling. The voting keypads, after transmission of its data, close the transmitter. In this status the receiver is active.

3.3 Special Accessories

None.

As shown in Figure 3.1 all interface cables used for compliance testing are shielded as:

- RS 232 readily available on the market,
- RS 485 normally supplied by Logos Av Com Company.

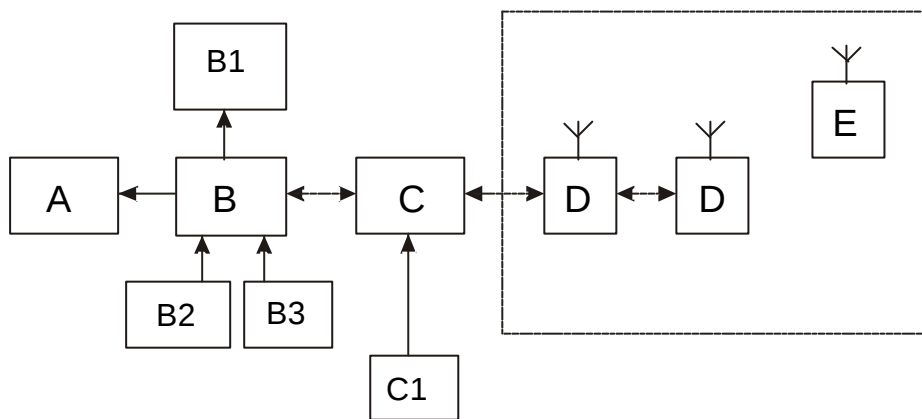
3.4 Equipment Modifications

To achieve compliance to Class B levels, no changes were made during compliance testing.

3.5 Configuration of the Tested System

Figure 3.1 Configuration of the Tested System

Test Configuration



A = Printer
B = PC box
 B1 = Monitor
 B2 = Keyboard
 B3 = Mouse
C = Master
 C1 = Additional power supply
D = **EUT** Slave
E = remote Televoter keypad

Test Report No. RD2003/208bis
Date November 24th, 2003

FCC ID: OM4SLV-MA-US

4 BLOCK DIAGRAM(S) OF THE EUT

4.1 Block Diagram Description

The controller board of the EUT is provided with:

Crystals and oscillator:

- Quartz oscillator 5 MHz model MEC QSXTM 05.000 BG55LR
- Hybrid transceiver (TX/RX) model RFM TR1000 916.50 MHz

RF suppression devices :

- Zener diode 15 V.
- Ferrite Bead BLM11 Murata on TX side of the transceiver

Fig. 4.1 - Block Diagram of the EUT

> See exhibit < block diagram

Test Report No. RD2003/208bis
Date November 24th, 2003

FCC ID: OM4SLV-MA-US

CONDUCTED AND RADIATED MEASUREMENT PHOTOS

> See exhibit < test setup photos

6 CONDUCTED EMISSION DATA

(According to section 15.207 of the FCC rules)

6.1 Tests of the worst case configuration.

The conducted tests are performed with a receiver in quasi-peak mode.

	Frequency (MHz)	Measured* (dBμV)	QP limit (dBμV)	AV Limit (dBμV)
Neutral	0.15	43	66	56
	0.26	34	62	52
	5.6	34	60	50
	12	37	60	50
	17	43	60	50
	20	38	60	50
Line	0.15	42	66	56
	0.26	35	62	52
	5.6	33	60	50
	12	36	60	50
	17	44	60	50
	20	37	60	50

* All readings are quasi-peak

Test Personnel:

Tester Signature  Date October 16, 2003

Typed/Printed Name Giuseppe MECCHIA

7 RADIATED EMISSION DATA

- frequency range 30 MHz – 10 GHz (10th Harmonic of highest fundamental frequency generated).

7.1 Tests of the worst case configuration

The following data list the significant emission frequencies, measured levels, correction factors (including cable and antenna corrections), the corrected reading, plus the limit. Field strength calculation is given in paragraph 7.2.

Judgement: Passed by 0.3 dB

Spurious emissions (limits according to section 15.209).
Section 15.205 Restricted band requirements is fulfilled

Frequency (MHz)	Polarity (V/H)	Receiver* Reading (dBμV)	Correction Factor (dB/m)	Corrected Reading (dBμV/m)	3 Meter Limit (dBμV/m)
30	V	23.2	15.2	38.4	40
40	V	26.1	13.4	39.5	40
140	V	28.7	14.5	43.2	43.5
200	V	25.6	14.1	39.7	43.5
262.4	H	22.2	16.1	38.3	46
928	H	10.9	30.6	41.5	46

Fundamental and harmonics (limits according to section 15.249).
(worst case: continuous transmission cw, signal always on)

916.5	V	62	30.6	92.6 QP	94
		62.3		92.9 PK	
1833	V	12.7	27.2	39.9 PK	54
2749.5	V	10.6	30.5	41.1 PK	54
3666	V	10.3	32.1	42.4 PK	54
4582.5	V	10.5	33.3	43.8 PK	54
5499	V	11.2	34.4	45.6 PK	54

No other harmonics detected above noise floor.

* below 1 GHz readings are quasi-peak, with an IF bandwidth of 120 kHz,
above 1 GHz are peak with an IF bandwidth of 1 MHz.
Video bandwidth used for both frequency ranges is 1 MHz

Test Personnel:

Tester Signature *G. Meccia* Date October 16, 2003

Typed/Printed Name Giuseppe MECCHIA

7.2 Field Strength Calculation

7.2.1 The field strength is calculated by adding the Antenna and Cable Factor to the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where

FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 23.2 dB μ V is obtained. The Antenna and Cable Factor of 15.2 is added, giving a field strength of 38.4 dB μ V/m. The 38.4 dB μ V/m value was mathematically converted to its corresponding level in μ V/m.

$$FS = 23.2 + 15.2 = 38.4 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(38.4 \text{ dB}\mu\text{V/m})/20] = 83.17 \mu\text{V/m}$$

8 PHOTOS OF TESTED EUT

> See exhibit < internal & external photos

User Manual

> See exhibit <